

Notice of Allowability

Application No.

10/618,393

Examiner

Kathleen S. Yuan

Applicant(s)

KRAHNSTOEVE ET AL.

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 10/15/2007.
2. ☒ The allowed claim(s) is/are 17,18,21,22,23,27,23,31-33.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

JINGGE WU
SUPERVISORY PATENT EXAMINER

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Rajeev Sharma on 11/5/2007.

The application has been amended as follows:

Claim 17 will be amended to read, "A method for visually tracking a target object in three dimensions, comprising the steps of:

- a) capturing the target object with two or more imaging sensors,
- b) maintaining a large number of 3D target location hypotheses,
- c) initially distributing a first set of 3D target location hypotheses randomly in spaces viewed by said imaging sensors.
- d) calculating locations of a second set of 3D target location hypotheses by adding offsets to locations of the first set of 3D target location hypotheses, wherein the offsets are randomly drawn between two numbers,
- e) projecting each of the second set of 3D target location hypotheses from 3D space to 2D image spaces of said imaging sensors,

f) measuring confidences about a presence of the target object based on a combination of color and motion cues in each image captured by said imaging sensors, wherein the color and motion cues are spatially spread out using averaging before the color and motion cues are combined, and

g) combining the measured confidences of the second set of 3D target location hypotheses to obtain a 3D location of the target object, wherein the 3D location of the target object is given by a weighted mean of all the second set of 3D target location hypotheses.”

Claim 18 will be amended to read, “The method according to claim 17, wherein the step of e) projecting each of the second set of 3D target location hypotheses further comprises a step of utilizing projections that are obtained by calibrating said imaging sensors with respect to a reference coordinate system.”

Claim 22 will be amended to read, “The method according to claim 17, wherein the method further comprises a step of calculating the motion cues by measuring differences between the images captured sequentially by said imaging sensors.”

Claim 27 will be amended to read, “An apparatus for visually tracking a target object in three dimensions, comprising:

- a) means for capturing the target object with two or more imaging sensors,
- b) means for maintaining a large number of 3D target location hypotheses,

c) means for initially distributing a first set of 3D target location hypotheses randomly in spaces viewed by said imaging sensors.

d) means for calculating locations of a second set of 3D target location hypotheses by adding offsets to locations of the first set of 3D target location hypotheses, wherein the offsets are randomly drawn between two numbers,

e) means for projecting each of the second set of 3D target location hypotheses from 3D space to 2D image spaces of said imaging sensors,

f) means for measuring confidences about a presence of the target object based on a combination of color and motion cues in each image captured by said imaging sensors, wherein the color and motion cues are spatially spread out using averaging before the color and motion cues are combined, and

g) means for combining the measured confidences of the second set of 3D target location hypotheses to obtain a 3D location of the target object, wherein the 3D location of the target object is given by a weighted mean of all the second set of 3D target location hypotheses.”

Claim 28 will be amended to read, “The apparatus according to claim 27, wherein the e) means for projecting each of the second set of 3D target location hypotheses further comprises means for utilizing projections that are obtained by calibrating said imaging sensors with respect to a reference coordinate system.”

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Claim 32 will be amended to read, "The apparatus according to claim 27, wherein the apparatus further comprises means for calculating the motion cues by measuring differences between the images captured sequentially by said imaging sensors."

2. The following is an examiner's statement of reasons for allowance: Prior art does not disclose the randomly distributed 3D target location hypotheses, adding an offset to these hypotheses, projecting the hypotheses into the 2D space of image sensors, and finding the location of an object based on the weighted mean of the hypotheses which is based on confidences which are found with color and motion cues, which are combined after they are spatially spread out.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen S. Yuan whose telephone number is (571)272-2902. The examiner can normally be reached on Monday to Thursdays, 9 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571)272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KY
11/5/2007



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SUPERVISORY PATENT EXAMINER

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Proposed Examiner's Amendment for claim 17:

17. A method for visually tracking a target object in three dimensions, comprising the steps of:

- a) capturing the target object with two or more imaging sensors,
 - b) maintaining a large number of 3D target location hypotheses,
 - c) initially distributing a first set of 3D target location hypotheses randomly in spaces viewed by said imaging sensors.
 - d) calculating locations of a second set of 3D target location hypotheses by adding offsets to locations of the first set of 3D target location hypotheses, wherein the offsets are randomly drawn between two numbers,
 - e) projecting each of the second set of 3D target location hypotheses from 3D space to 2D image spaces of said imaging sensors,
 - f) measuring confidences about a presence of the target object based on a combination of color and motion cues in each image captured by said imaging sensors, wherein the color and motion cues are spatially spread out using averaging before the color and motion cues are combined, and
 - g) combining the measured confidences of the second set of 3D target location hypotheses to obtain a 3D location of the target object,
- wherein the 3D location of the target object is given by a weighted mean of all the second set of 3D target location hypotheses.

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18. The method according to claim 17, wherein the step of e) projecting each of the second set of 3D target location hypotheses further comprises a step of utilizing projections that are obtained by calibrating said imaging sensors with respect to a reference coordinate system.

21. No amendment needed.

22. The method according to claim 17, wherein the method further comprises a step of calculating the motion cues by measuring differences between the images captured sequentially by said imaging sensors.

23. No amendment needed.

All other claims would be amended to be commensurate with the above proposed amendments.